

We claim:

1        1.        A method of optically patterning a photomask using a direct write continuous wave  
2        laser, comprising:

3                    a) applying an organic antireflection coating over a metal-containing layer;

4                    b) applying a chemically-amplified positive tone or negative tone DUV  
5        photoresist over said organic antireflection coating;

6                    c) post apply baking said DUV photoresist over a temperature ranging from  
7        about 105 °C to about 115 °C;

8                    d) exposing a surface of said DUV photoresist to radiation from said direct  
9        write continuous wave laser; and

10                   e) post exposure baking said DUV photoresist over a temperature ranging  
11        from about 70 °C to about 90 °C.

1        2.        The method of Claim 1, wherein said organic antireflective coating contains a  
2        material selected from the group consisting of a negative photoresist containing a DUV dye,  
3        a polymeric material prepared from acrylic polymers or copolymers, a binder resin  
4        combined with an acid or thermal acid generator and a photoacid generator compound, a  
5        binder resin having pendant phenyl groups, and combinations thereof.

1        3.        The method of Claim 2, wherein said organic antireflective coating includes a  
2        material selected from the group consisting of hydroxyalkyl acrylate or methacrylate,  
3        hydroxycycloalkyl acrylate or methacrylate, hydroxyalkylcycloalkyl acrylate or  
4        methacrylate, glycidyl methacrylate, and combinations thereof.

1        4.        The method of Claim 1, wherein said chemically-amplified DUV photoresist

contains an onium salt metal halide complex.

5. The method of Claim 1, or Claim 2, or Claim 3, or Claim 4, wherein said direct write continuous wave laser operates at a wavelength of 244 nm or 257 nm.

6. The method of Claim 5, wherein said wavelength is 257 nm.

7. The method of Claim 5, wherein said post exposure baking is carried out at least one hour after exposing of said DUV photoresist to radiation.

8. A method of optically patterning a photomask using a direct write continuous wave laser, comprising:

a) applying or creating an inorganic antireflection coating over a metal-containing layer;

b) applying an organic antireflection coating over said inorganic antireflection coating;

c) applying a chemically-amplified positive tone or negative tone DUV photoresist over said organic antireflection coating;

d) post apply baking said DUV photoresist over a temperature ranging from about 105 °C to about 115 °C;

e) exposing a surface of said DUV photoresist to radiation from said direct write continuous wave laser; and

f) post exposure baking said DUV photoresist over a temperature ranging from about 70 °C to about 90 °C.

9. The method of Claim 8, wherein said inorganic antireflection coating is selected from the group consisting of chrome oxynitride, titanium nitride, silicon nitride,

3 molybdenum silicide, and combinations thereof.

1 10. The method of Claim 8, wherein said organic antireflective coating contains a  
2 material selected from the group consisting of a negative photoresist containing a DUV dye,  
3 a polymeric material prepared from acrylic polymers or copolymers, a binder resin  
4 combined with an acid or thermal acid generator and a photoacid generator compound, a  
5 binder resin having pendant phenyl groups, and combinations thereof.

1 11. The method of Claim 10, wherein said organic antireflective coating includes a  
2 material selected from the group consisting of hydroxyalkyl acrylate or methacrylate,  
3 hydroxycycloalkyl acrylate or methacrylate, hydroxyalkylcycloalkyl acrylate or  
4 methacrylate, glycidyl methacrylate, and combinations thereof.

1 12. The method of Claim 8, wherein said chemically-amplified DUV photoresist  
2 contains an onium salt metal halide complex.

1 13. The method of Claim 8, or Claim 9, or Claim 10, or Claim 11, wherein said direct  
2 write continuous wave laser operates at a wavelength of 244 nm or 257 nm.

1 14. The method of Claim 13, wherein said wavelength is 257 nm.

1 15. The method of Claim 13, wherein said post exposure baking is carried out at least  
2 one hour after exposing of said DUV photoresist to radiation.